

## READ THIS INFORMATION BEFORE YOU START AN LED SIGN PROJECT!

This download packet includes the following files:

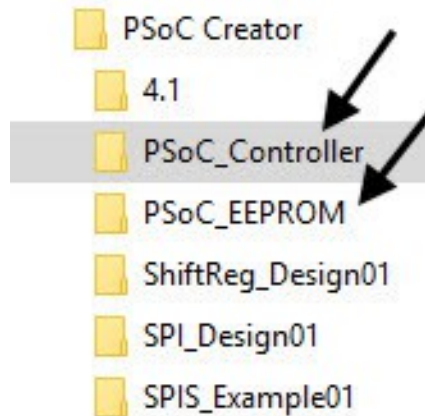
ReadFirst.pdf	This document
Workspace01.cywrk.Archive01.zip	PSoC Controller Project
PSoC Controller.c	C file for PSoC Controller
PSoC Controller.pcb	ExpressPCB layout for Controller Board
PSoC Controller.sch	ExpressPCB circuit diagram
PSoC Control BOM.xlsx	Parts list for Controller board
PSoC PCB Ctrl G	Folder: Gerber files for the Controller Board
Workspace02.cywrk.Archive02.zip	PSoC EEPROM Loader
PSoC EEPROM.c	C file for PSoC EEPROM
PSoC Display8.pcb	ExpressPCB layout for an 8-by-8 LED matrix module
PSoC PCB Display G	Folder: Gerber files for an 8-by-8 LRD module board
PSoC Display5.sch	ExpressPCB circuit diagram for 5-by-7 modules
PSoC Display8.sch	ExpressPCB circuit diagram for 8-by-8 modules
8x8 LED Pinouts.pdf	Pin assignments. See text.
8x8 Module Connect.pdf	Board-to-board connections for 8x8 module. See text.
LED Module Pinouts.pdf	Pin assignments for 8x8 module connectors.
PSoC Two Line.c	Experimental C file for my 2-line display.

### **How to use the PSoC EEPROM and PSoC Controller projects in the PSoC Creator software.**

The following descriptions assume you have downloaded the free PSoC Creator software from the Cypress Semiconductor web site and have installed the basic configuration, that also might be noted as a "typical" installation. I used version 4.1 in the LED-sign project. Cypress might offer newer versions.

1. Your Windows PC should already have a Documents folder. If it does not contain a sub folder labeled PSoC Creator, add a PSoC Creator folder under Documents.

Within the PSoC Creator folder, add two subfolders, PSoC\_EEPROM and PSoC\_Controller. (See the next image.)

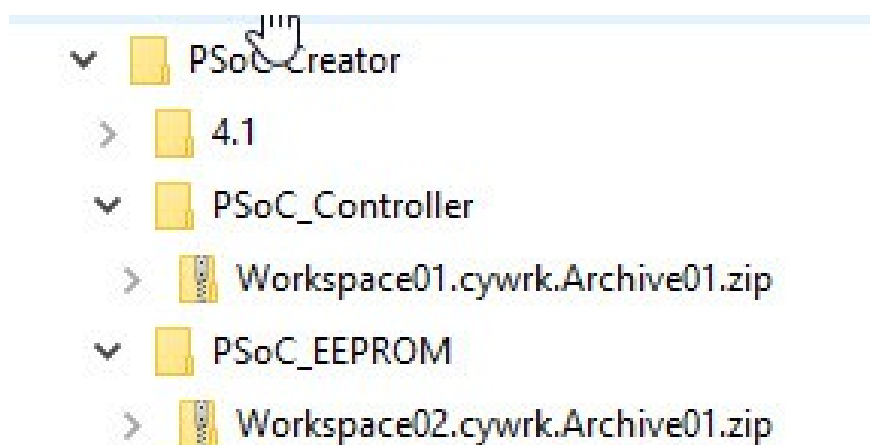


2. Locate the two compressed folders in the download package:

Workspace01.cywrk.Archive01.zip

Workspace02.cywrk.Archive01.zip

Paste the Workspace01.cywrk.Archive01.zip file in the PSoC\_Controller folder.  
Paste the Workspace02.cywrk.Archive01.zip file in the PSoC\_EEPROM folder. Your folders should look like this:



3. Go to the PSoC\_Controller folder and right click on the file named:

Workspace01.cywrk.Archive01.zip

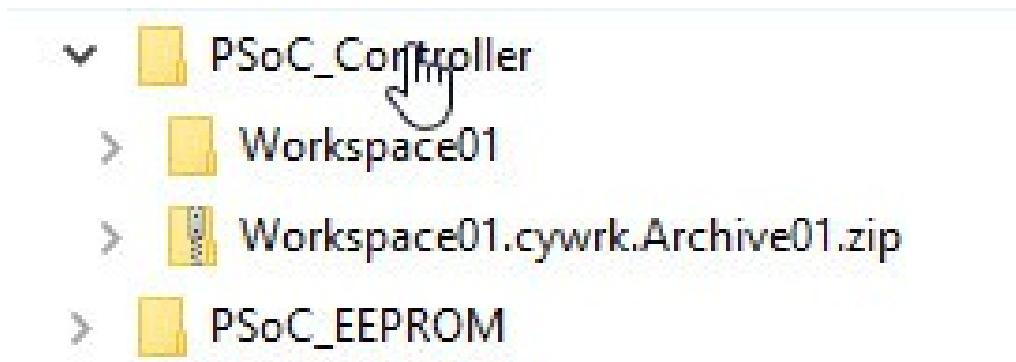
In the window that appears, choose "Extract All..."

Another window will open and display "Select a Destination and Extract files." In the area, "Files will be extracted to this folder:" change the folder name to:

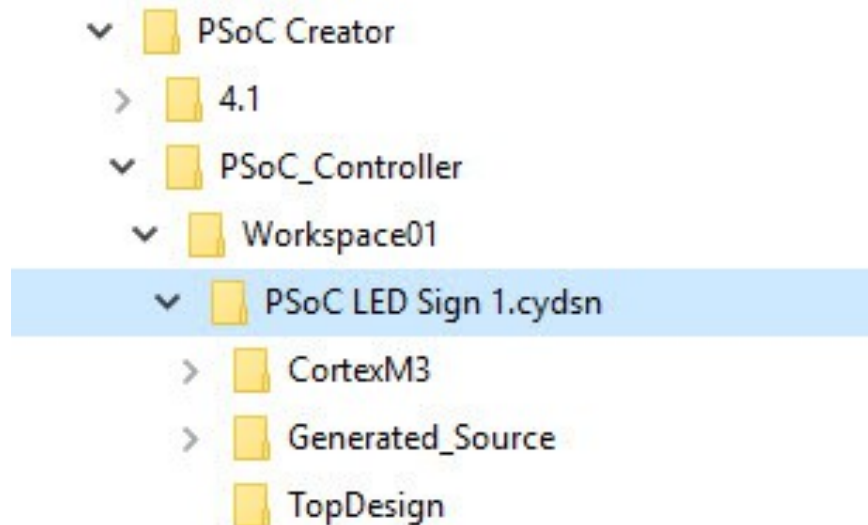
C:\... ..Documents\PSoC Creator\PSoC\_Controller\

The section between the dots depends on how you configured files on your PC.

4. Now click on "Extract." The extraction takes a few seconds because it involves almost 300 files. When the extraction finishes, you should see the file arrangement below:



You will see the original ZIP file and the Workspace01 folder. When you look in the Workspace01 folder you will see:



5. Go to the PSoC\_EEPROM folder and right click on the file named:

Workspace02.cywrk.Archive01.zip

In the window that appears, choose "Extract All..."

Another window will open and display "Select a Destination and Extract files." In the area, "Files will be extracted to this folder:" change the folder name to:

C:\... ..Documents\PSoC Creator\PSoC\_EEPROM\

The section between the dots depends on how you configured files on your PC.

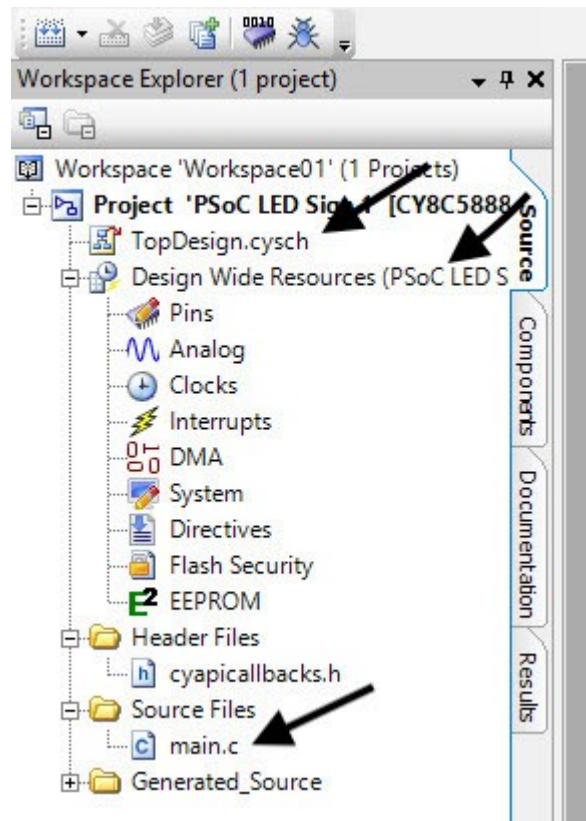
6. You now have workspaces and files set up for the sign controller and the EEPROM loader projects. I suggest you leave the ZIP files as they are in case you need to go back to the original PSoC designs.

## **Run a Project**

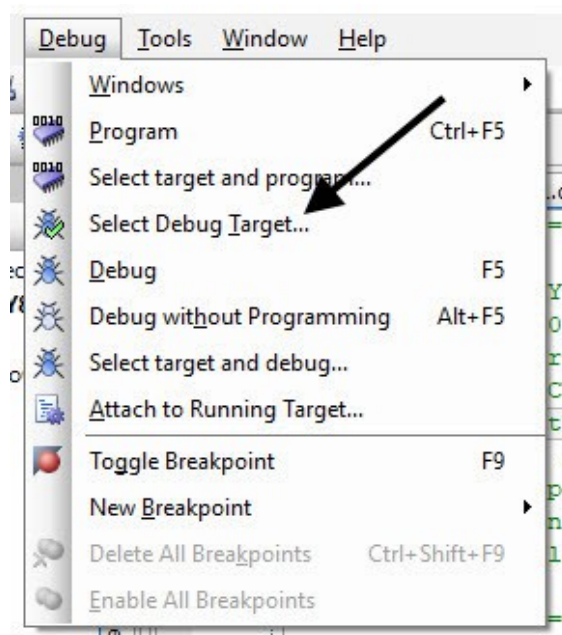
Before you run a PSoC Creator project, please go through the document "Getting Started with PSoC 5LP," AN77759, available on the Cypress Semiconductor web site. Go through the example project. This exercise and information will give you a good start with a PSoC project.

You may start either the EEPROM or the Controller project. I'll go through the steps for the Controller and you can use the same steps for the EEPROM-loading project.

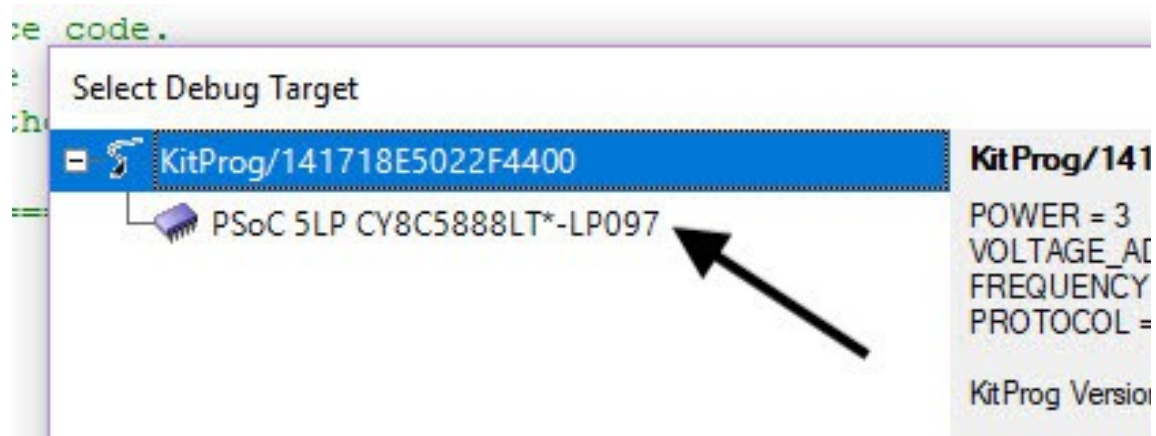
Start the PSoC Creator software. Go to the File menu and choose Open. Then select Project/Workspace that opens a file-browser window. Look for the PSoC Creator folder and under it find the PSoC\_Controller folder. Underneath that folder find and open the Workspace01 folder. You will see a file, Workspace01.cywrk. Select this file and click on open. The project will load and you can see a list of files in the Workspace Explorer window on the left.



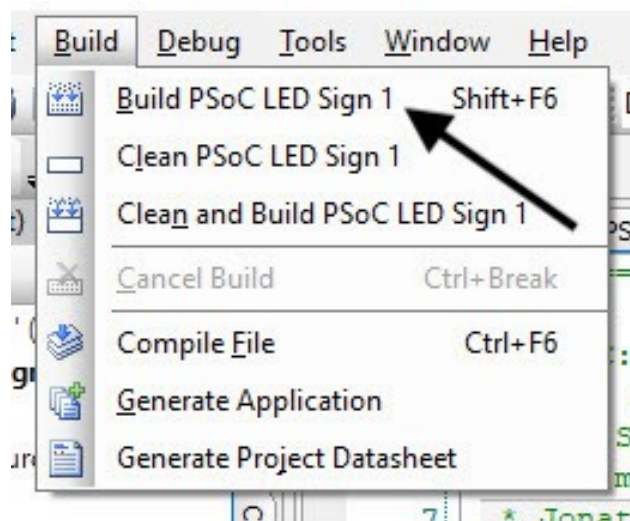
Click on TopDesign.cysch, on Design Wide Resources, and on main.c. Now you will have three overlapping windows in the main editing window. Click on the tabs along the top of the main window to change the window displayed. You will see a schematic diagram of the internal PSoC components, the C-code listing, and the PSoC IC's pin assignments.



Before you can run a project you must identify a "target," your CyCCKIT-059 board. Open the Debug menu and choose Select Debug Next you will see a list of PSoC devices attached to your computer. Choose your board.



Now you can compile the project and download it to your board. Go to the Build menu and choose Build PSoC LED Sign 1:



Your PC will display any errors or warnings, along with messages in the small Output window at the bottom of the PSoC Creator window. You should not see any compilation errors.

Go to the Debug menu and choose Program. Your code gets downloaded to your PSoC board. And your program will start.

## More Information

Two files in this package provide the pin locations and pin-out legends for the LED Sign Controller board and the Display Module. Also you have pin-out legend for the 8-by-8 LED matrix used in my Display Module design. Solder jumpers between boards. Screw holes let you mount the boards so the 8-by-8 display modules abut each other. Many LED-matrix modules include tabs on slots that provide for snug module alignments.

One file includes a diagram for "daisy-chained" Display Module jumpers. The short jumper wires simplify board-to-board connections and modules with 60-by-60-mm LED matrices will form a line without gaps.

## Construction Thoughts

- a. I created the Display Module PCB so the 8-by-8 LED matrix connects to the Display Side of the display PCB. The eight resistors and the TPIC6B595 shift register attach to the Component Side. I recommend two strips of female headers for the LED module, and a 20-pin IC socket for the TPIC6B595.
- b. Connect the FET drivers to your display's row connections with a 4-40 (or M-2.5) machine screw, lock washer, solder or crimp lug, and a nut through the hole in the FETs' tabs. There is no other connection for the row drivers on the PCB. You should NOT need a heat sink for the IRF9520 FETs because each turns LED-drive current on for only one-seventh or one-eighth of the time. If you decide to use a heat sink, DO NOT connect the metal tabs on the IRF9520 FETs to a common piece of metal! The tab on the TO-220 packages are active electrical connection to the FET's drain.
- c. If you have not soldered surface-mount-technology (SMT) components to a PCB, here's a helpful video: <https://www.youtube.com/watch?v=fq8A95AQFYU>. I recommend people use liquid electronics flux on the PCB contacts and on the SMT IC for the LED Sign Controller. Solder the SMT on the board before you add other components. The video shows a large capacitor near the SMT solder pads. You don't want to hit nearby components with a soldering iron, so solder the SMT IC first, then add the other components. A clear "field" around SMT components makes them easier to hold in place and solder.

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